SURVEYING A LAKE WATERSHED

Data Collection Forms

GUIDANCE FOR COMMUNITY VOLUNTEERS IN MASSACHUSETTS

Data sheets based on materials from

Massachusetts Department of Environmental Protection
Massachusetts Riverways Programs, Adopt-A-Stream Program,
Department of Fisheries, Wildlife, and Environmental Law Enforcement
Massachusetts Water Watch Partnership
Maine Department of Environmental Protection

2003

Tips for Surveying a Lake and Pond Watershed

The purposes of this survey are to organize residents and officials of communities to work together to solve problems and to protect resources of lakes and ponds. The survey, a cooperative venture, is a primary step in this process. In addition, the success of the survey depends upon volunteers and landowners. Before the survey takes place, all landowners need to be invited to participate in the survey, notified of purposes of the survey, and have an opportunity to give permission for volunteers to walk their property.

This survey form is designed for use with the *Massachusetts Volunteers Guide for Surveying a Lake Watershed and Preparing an Action Plan* (2001). To ensure that the survey is successful, volunteers should be aware of the following safety tips.

Safety and Legalities

- Always walk with someone.
- Watch out for irate dogs. Walk cautiously and practice good dog etiquette.
- Do not drink the water.
- Lifejackets are required by law for each person in any canoe or boat.
- From September 15 to May 15 all canoe or kayak occupants must wear a U.S. Coast Guard Approved Personal Flotation Device.
- Wear long-sleeved shirts and pants to protect against, ticks, mosquitoes, poison ivy, and nettles.
- Wear insect repellent if necessary.
- Consider landowner rights. Ask permission to cross private land, posted or not.
- Do not enter posted areas without permission. Take advantage of public access points.

Environment:

- Don't walk on unstable banks; your footsteps could speed erosion.
- Be aware of wildlife and animal homes, for both of your sakes.

NEVER PUT YOURSELF IN DANGER TO GATHER SURVEY INFORMATION.

If at anytime you feel uncomfortable about the bank or waterbody conditions or surroundings, please STOP your survey. You and your safety are much more valuable than any of the objectives of the watershed survey.

Checklist: What to take on your survey

___ A buddy
___ Data forms and topo map
___ Clipboard or other surface for writing
___ Two pencils – color is good to mark on maps
___ Long-sleeved, snag-free clothing /pants (for bugs and thorns)
___ Sunblock
___ Sunglasses (polarized to see into the water better)
___ Lifejackets & paddles if canoeing
___ Camera and film
___ Gloves
___ Copy of letter sent out to landowners
___Flashlight for checking culverts

Optional

___ Rubber boots or waders
___ Yardstick or measuring tape (useful for pipes)
___ Compass
___ Field guides (in ziplock bags)
___ Food, for energy!

Fill out your data sheets, get them to your team leader, and attend action planning meeting, which will be held on: _____ Section Team Leaders will forward completed data sheets (with priority sheets) to:

Water Quality 101

Clean Water Act (CWA) – A federal law establishing comprehensive national policies for water quality management. The essence of the CWA is to have all US waters "fishable and swim able".

303(d) List – The list of waterbodies in Massachusetts or any other state that fail to meet water quality standards.

Total Maximum Daily Load (TMDL) – The greatest amount of a pollutant that a waterbody can accept and still meet water quality standards. TMDLs are established by Massachusetts Department of Environmental Protection (DEP) as the major key to remediation plans for impaired lakes and stream- the remedial plan itself is also generically called a TMDL. The U.S. Environmental Protection Agency requires that TMDLs be developed for every waterbody on the 303(d) list.

Many lakes and ponds in Massachusetts have an excess annual loading of phosphorous. Some lakes and ponds are on the 303(d) list and have TMDLs from Massachusetts DEP that call for reductions in phosphorous.

Phosphorus – A nutrient often serving as the limit to plant/vegetation growth in freshwater systems. Excessive amount of phosphorus in a water body can lead to a condition of unchecked plant and algae growth known as eutrophication.

What are major sources of phosphorous?

- Phosphorous is found in lawn fertilizers, sewarage, motor oils, and some detergents.
- Phosphorous is very abundant in stormwater runoff.
- Phosphorous binds to soil and sand particles and other sediments.

What are some ways phosphorous gets to the lake or stream?

- Picked up by stormwater and carried directly to the water overland or through storm drains.
- Scoured out with sediments by erosion.
- Leach through groundwater from failing septic systems.

Other important terms:

Best Management Practices (BMPs) – Techniques which may be nonstructural, structural or managerial capable of effectively and economically reducing nonpoint sources of pollution.

Nonpoint Source Pollution (NPS) – Pollution originating from multiple and diffuse sources – as opposed to point source pollution which can be traced to a pipe or other single, discrete source. **Storm water runoff** is a significant contributor of nonpoint pollutants since it washes pollutants from impervious surfaces such as roadways, roofs, lawns and other surfaces.

Sedimentation and siltation- An increase, above natural levels, in the amount of sand and silt carried to a water course. This increase can lead to impairments including loss of habitat, loss of spawning areas, decrease in light penetration, increase in scour and an increase in bacterial and other pollutants. Also, nutrients such as phosphorous can bind to sand and silt particles and can be carried into the waterbodies along with the sediments.

Watershed – The geographic region within which all water drains to a particular river, lake, wetland or other water body. It includes an area of land contributing all its runoff and drainage to this common point. Large watersheds may be divided into smaller sub-watersheds.

PRE-SURVEY

LAKE and POND **WATERSHED** FORM

Lake and Watershed Name: _____
Survey Area Name & Number: _____
Surveyors Names: _____

A. Description of the Area from a Topographic Map *(Maps will be available at the training session.)*

1. Consider the developed *(white)* and undeveloped areas *(green*) on your map? What % of each do you see?
   _____% developed _____ % undeveloped
2. Are there steep slopes in the sub-watershed, indicating a potential for increased runoff or erosion? (*How close together are the contour lines*?)
   ____Yes ____No
3. How many tributaries enter or cross your area?___
4. What kinds of development are shown on the map?
   (Include major development in the watershed, as well as the shoreline, that could have an impact on the lake.)

B. General Categories of Land Uses in your Area – (From general knowledge)

___ % Construction
___ % Residential
___ % Roads
___ % Agricultural land
___ % Commercial, Industrial and Urban Areas
___ % Logging/forestry
___ % Other (*please specify, e.g. , rural, open, or recreational)*_____

C. If Residential *(Estimate % of area; information will be available at the training.)*

___Multifamily
___<1/4 acre lots
___1/2-1 acre lots
___>1 acre
____year round
____seasonal

D. Is the area sewered? _____ or unsewered _____?
Do you know of any major discharges to the waterbody or its tributaries? (e.g., permitted, stormwater)

E. Watershed History and Characteristics *What do people know about this area?*

General description: _____
_____

Historical information:_____
_____

Problems to look for during site visit: *(e.g., If there is a new development near a stream, you will want to look upstream and downstream of the site for evidence of erosion and sedimentation and excessive vegetation in the stream. If you see erosion downstream of the development you may be able to track the problem back to its source.)*

1. _____
   _____
2. _____
   _____
3. _____

CONTINUE YOUR SURVEY:

- If your survey section is a **near-shore area**, continue on to the next page and fill out the near shore area field sheets (the yellow page).
- If your survey section is an **upland watershed area**, skip the next page and use the upland watershed area field sheets (the orange page).

FIELD SHEETS – NEAR-SHORE

LAKE and POND **WATERSHED SURVEY** FORM – **NEAR SHORE AREA**

Lake and Watershed: _____ Survey Date:_____
Surveyors Names: _____ Area Name & Number: _____
Weather Today: _____ Weather (past 2-5 days)_____
Landowners Contacted During Survey: ____yes ____no

A. General Categories of Land Uses Around and Upstream of Your Survey Section *(Identify the land use category on the site. May be more than one land use.)*

___ % Construction
___ % Residential
___ % Roads
___ % Agricultural land
___ % Commercial, Industrial and Urban Areas
___ % Logging/forestry
___ % Other (*please specify, e.g. , rural, open, or recreational)*_____

A.1. Specific Land Use on the Your Survey Section *(Estimate % of site in each use. May be more than one land use.)*

___commercial
___industrial
___junk yard
___railroad
___bridge
___highway
___dirt road
___local road
___parking lot
___golf course
___grazing/pasture
___park or beach
___protected open space
___undeveloped land
___meadow
___forest
___wetland
___other *(specify)*_____

A.2. If Residential *(Estimate % of site that is…)*

___Multifamily
___<1/4 acre lots
___1/2-1 acre lots
___>1 acre (*400 x 100 feet)*
___year round
___seasonal

B. Site characteristics

1. Dominant shoreline material is…
   ___gravel ___sand ___silt ___clay ___dark organic muck & peat ___other

2. Slope of site is… ___flat ___moderate ___steep

3. The shoreline or riverbank is… *(Check a or b, if there is a stream, ditch, shoreline, or steep bank on site.)*
   a)___vegetated with…
      ___exposed roots
      ___shrubs and native grasses (< 20 feet)
      ___trees taller than 20 feet
   b)___unstable and…
      ____undercut
      ____eroded

4. Vegetated Cover:
   a) How much of the near-shore water is shaded by trees and shrubs? *(estimate shading from 10 AM - 2 PM)*
      ___0-25% ___25-50% ___50-75% ___75-100%
   b) The % of the bank area that is covered by each of these vegetation types is…
      ___% grasses ___% shrubs ___ % trees (>20 feet) ___% little or none
   c) How far back from the shoreline does the band of trees, shrubs, or grasses extend?
      ___0-5 feet ___5-50 feet ___50-100 feet ___greater than 100 feet

C. Site drainage

1. **Site runoff is directly to…**
___lake ___stream ___ditch ___ catch basin ___vegetated buffer ___wetland other *(describe)*_____

Over

FIELD SHEETS – NEAR SHORE

LAKE and POND **WATERSHED SURVEY** FORM – **NEAR SHORE AREA**

C. Site drainage, ***continued***

2. **Site runoff is from…**

Construction: ___disturbed areas <1 acre) ___disturbed areas >1 acre ___exposed soil
___altered drainage pathways ___absence/failure of erosion controls

Residential: ___driveways ___lawns (____ <1 acre ___ >1 acre)
___lush lawns ___exposed soil ___evidence of erosion
___pet waste ___pipe drains

Roads: ___pavement to catch basin ___bridge ___shoulders/country drainage
___drainage to waterbody ___evidence of erosion ___sand build up in road
___sediment in ditches/culverts/drains

Agricultural: ___field ___animal grazing area ___manure storage area
___exposed soil ___animals in waterbody ___storage areas uncovered

Commercial, ___parking lot ___vehicle maintenance yard ___industrial area
Industrial ___waste storage area ___drain pipes to waterbody ___sediment in ditches/culverts
& Urban: ___paved areas ___trash/waste storage near waterbodies

Logging/ ___logging yard ___roads/trails ___stream crossings
Forestry: ___forested areas ___exposed soil ___poor roads
___brush/slash near waterbodies

Other: ___*(specify)* _____

D. Land disturbances that affect water quality

1. Do you see evidence of excess nutrients? *(Check all that apply)*

___**Soil erosion:** ___silt ___sand ___soil ___stockpiled soil
___**Evidence of runoff:** ___rills ___gullies ___channel ___sedimentation
___**Evidence of nutrients:** ___pet waste/manure ___fertilizer use ___green lawns other*(specify)* _____

2. Do you see any of the following? *If there are tributaries, catch basins drain pipes, and/or culverts on the site, explain your observation.*

___Tributaries bringing in siltation:_____
___Pipes/culverts (*describe conditions*):_____
- Describe what is going into the pipe *(Add color and odor)*:_____
- Describe any discharge from the pipe *(Add color and odor*):_____

___Full catch basins: full with *(circle)*: trash sand pet waste oil other_____
**Note problem catch basins on your map.*

E. Water quality concerns *(Check all that apply, describe the location and cause, and indicate site on map)*

___Oily sheen or smell: _____
___Sewage: *(odor, milky color, toilet paper)*_____
___Foam or scum: (*does a stick break it up? If it does, foam is probably natural.)*_____
___Fishy odor or fish kill:_____
___Algae or aquatic weeds (*excessive growth)*:_____
___Floating trash:_____
___Obvious sedimentation: *(e.g., sand)* _____

F. Habitat and wildlife *(Evidence of…)*

___Fish: (fish, fish nests, anglers) *Identify species if known*_____
___Other aquatic life: __insects, __turtles, __frogs, __snails, __mussels, __clams, other:_____
*Identify species if known:*_____
___Waterfowl: __herons, __ducks, __geese, __loons, other_____
___Areas of good habitat with wildlife: D*escribe*_____

End of Near Shore Area Field Sheets: Skip the next page, go to Pipe, Narrative, Priority & Map Pages

FIELD SHEETS - UPLAND

LAKE & POND **WATERSHED SURVEY** FORM – **UPLAND WATERSHED AREA**

Lake/Watershed: _____ Survey Date:_____
Surveyors' Names: _____ Area Name & Number: _____
Weather Today: _____ Weather – past 2-5 days: _____

A. General Categories of Land Uses in Your Survey Section *(Identify the land use category on the site. May be more than one land use.)*

___ % Construction
___ % Residential
___ % Roads
___ % Other (*please specify, e.g. , rural, open, or recreational)*_____
___ % Agricultural land
___ % Commercial, Industrial & Urban Areas
___ % Logging/forestry

A.1. Specific Land Use in Your Survey Section *(Estimate % of site in each use. May be more than one land use.)*

___commercial
___industrial
___junk yard
___railroad
___bridge
___highway
___dirt road
___local road
___parking lot
___golf course
___grazing/pasture
___park or beach
___protected open space
___undeveloped land
___meadow
___forest
___wetland
___other *(specify)*_____

A.2. If Residential *(Estimate % of site that is…)*

___Multifamily
___<1/4 acre lots
___1/2-1 acre lots
___>1 acre (*400 x 100 feet)*
___year round
___seasonal

C. Site drainage

1. **Site runoff is directly to…**

___lake ___stream ___ditch ___ catch basin ___vegetated buffer ___wetland other *(describe)*_____

2. **Site runoff from…**

Construction Sites

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Exposed soil and erosion.
___Alteration to drainage pathways or alteration near waterbodies or wetlands.
___Absence or ___Failure of erosion controls, such as silt fences and hay bales.
___Evidence of erosion, such as gullies or rills on the surface of the soil.
___Cloudy or discolored water in ditches, streams, wetlands, or lake.
___Sediment build-up in ditches, streams, wetlands, or lake.
___Construction on overly steep slopes.

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Roads:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Absence of vegetation or buffer between road and waterbody.
___Roads located on steep slopes.
___Street drains, storm sewers, and pipes that discharge directly to streams, lake, or wetland. **See Pipe Survey**
___Full or clogged catch basins? Full with *(circle)*: trash sand pet waste oil other_____
**Note problem catch basins on your map.*
___Damaged or eroded pipe or culvert outlets.
___Sediment buildup below pipe or along roadside.
___Washouts and crumbling pavement on roads and sidewalks.

Over

LAKE & POND **WATERSHED SURVEY** FORM – **UPLAND WATERSHED AREA**

C. Site drainage

2. **Site runoff from…**

Roads: ***continued***

___Ditch, culvert, or pipe washouts, undercutting, or gullies and rills along sides and bottom of road or ditch.
___Exposed soil in ditch channel.
___Long ditches without discharge points into vegetated areas.
___Erosion around inlets and outlets of culverts.
___Washed out or damaged culvert

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Residential areas:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Areas of bare soil.
___Turbid (cloudy) water.
___Evidence of erosion on driveways or other areas, such as gullies or rills on the surface of the soil, or sediment accumulation in ditches and streams.
___Bank instability—bare soil, slumping, or undercut banks.
___Removal of vegetation near shoreline, resulting in increased vulnerability to erosion.
___Absence of vegetation or vegetated buffer.
___Evidence of septic system problems— lawn with green patch, soggy or wet lawn, and/or sewage odor.
___Lush lawns.
___Pet waste.
___Improperly stored trash (e.g., trash barrels or dumpsters) or organic debris (grass clippings, leaves, compost) near a waterbody.

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Commercial, Industrial and Urban Areas:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Street drains, storm sewers, and pipes that discharge directly to streams, lake, or wetland. **See Pipe Survey**
___Full or clogged catch basins? Full with *(circle)*: trash sand pet waste oil other_____
**Note problem catch basins on your map.*
___Damaged or eroded pipe or culvert outlets. ___Sediment buildup below pipe or along roadside.
___Eroded or undercut banks due to increased stormwater volumes and flows.
___Cloudy, discolored, or smelly water in ditches,
___Green scum, oily sheen, or floatables on water.
___Absence of vegetation or vegetated buffer near waterbody.
___Altered and paved areas near waterbodies.
___Trash, vehicles, manure, or waste storage near waterbodies.
___Lush lawns.
___Pet waste problems.

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Agricultural:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see: ___exposed soil ___lack of vegetated buffer between fields and water body
___livestock in waterbody ___ manure storage area not enclosed

Logging / Forestry:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see: ___exposed soil ___eroding roads/trails ___clear-cut near waterbody/wetlands
___evidence of erosion at stream crossings ___turbid (cloudy) water in stream
___brush/slash near waterbodies

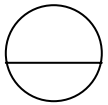
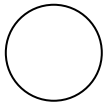
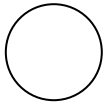
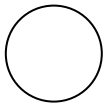
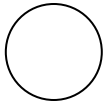
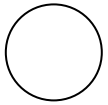
End of Upland Watershed Area Field Sheets: go to Pipe, Narrative, Priority & Map Pages

Lake Watershed Survey of _____ Watershed

Survey Section Name & Number_____ Date: _____ Names of observers: _____

Weather today: _____Weather over past 48-72 hours: _____

PIPES

Pipe#	Time	**Pipe material and condition**	**Pipe size & amount of flow**	**Is pipe a storm drain ?**	**Color/ Odor of Flow**	**Algae below pipe?** Yes No Describe extent	**Sediment below pipe**	**Comments? If pipe should be rechecked-describe location**
Sample #1	9:33 AM	Concrete in good shape	 Constant Moderate Flow 1' diameter	Yes	Red-brown / fetid	Green growth coating rocks across the entire stream width and 100 yards upstream.	Sand accumulation at outfall	Should be rechecked. Downstream of Jones St. Bridge
								
								
								
								
								

Lawns

Tally of lush lawns in your surveys section _____

Roof runoff

Tally of homes with roof drainage to pavement or other impervious surfaces _____

Lake Watershed Survey
Area Summary Sheet 1: Narrative

Date:_____ Survey Section :_____

Surveyors:_____

Today's weather:_____

Weather over past 24-48 hours:_____

These sheets are designed to (1) give the "big picture" of your area, and (2) describe the problems you have seen that could contribute to impaired water quality in the waterbodies of your watershed. The problems you have seen should be marked on your map (A, B, C, D) and described here. Identify the source of the problem whenever possible. This information provides the basis of the narrative description in your Lake or Pond Watershed Survey Report.

NARRATIVE DESCRIPTION

Sample.
We surveyed the south side of the pond from Oak to John Street. **(A)** There is a small stream, (about 1.5 feet across and 0.5 inches deep) that comes in just east of 3 Oak Street. The stream has a deep tea color but does not smell or have any algae. The bottom of the lake in this area is covered with decaying leaves/muck. This area also has woods coming up to the pond edge- a really well established vegetated buffer and lots of songbirds. **(B)** From 3 to 17 Oak Street, people's lawns come up to the edge of the water-no buffer. Some dumping of yard wastes close to the shoreline.

(C) Lots of illegal dumping- at the end of the maintenance access road for Rte. 13 (mostly construction type stuff)! There are 3 large erosion gullies beneath the pipes sticking out of the embankment (from the storm drains on the highway), and there is a large delta of sand forming in the water beneath the embankment. Smells like gasoline and there was a sheen in the water trapped by the tires. This area could be cleaned up and it would make a great boat ramp area. Plant a few trees and it would be a nice place to sit-the view is nice. Can we get permission from Mass Highway to do clean up work near Rte. 13?

(D) There is a thick coating of duckweed along the edge of "Ball Park Cove" and the rest of the cove is thick with milfoil, (a neighbor says it is milfoil-we are not sure). The storm drain across from a new subdivision, (intersection of Oak and John Streets), is clogged with dirt from the construction site.

Describe your area:

MAPPING PAGE

Survey area:_____
Surveyors:_____
Date:_____ Weather today:_____ Weather past 48 hours:_____

Draw a birds-eye view of your problem site, showing vegetation types and canopy along the streambank or shoreline, land uses, and other features. Include any details such as pipes, drainage ditches, or connections to wetlands or tributaries. Add assets such as habitat, recreation, and open space. If there is enough room write a brief description next to the problems found on site. If you need more room, label the problems A,B, C, on the map and describe these problems on the Narrative Summary Sheet. Be sure to include the following information : (1) where you have taken photos --use arrow showing direction, include photo number, (2) Mark problems, assets, and photo numbers on topographic map of your area.

Lake Watershed Survey
Area Summary Sheet 2: Priorities for Action

Surveyor's Names:_____
Section Name & Number:_____

Look back at your data sheets and include your observations. The information from this sheet will be used to develop the Watershed Survey Report and Action Plan.

PROBLEMS: Problems found in your area, such as pipes or culverts discharging in dry weather, erosion, runoff, trash, dense algae, water quality problems (odor, color, oil, foam, sewage), and degraded wetlands (phragmites, loosestrife) *(Describe and give location).* 1. 2.	ASSETS: Assets found in your area, such as good habitat, wildlife species, businesses, or landowners using the river (in a friendly way), recreational access (canoe, trails, parks), potential recreational access, and potential park/conservation land, scenic views *(Describe and give location).* 1. 2.	PRIORITIES FOR ACTION: List items from problems/assets columns that you feel need more work. 1. 2.

Based on sheets provided by the Massachusetts Riverways Programs/DFWELE